C L A I M S

1. A method of manufacturing a product having a plurality of components where at least some of the components are manufactured by different companies at differing locations, the method comprising the steps of:

developing an electronic specification describing the product and its components;

forwarding the electronic specification to one of the several companies;

the specific company building the component or product in accordance with requirements in the electronic specification;

the specific company testing the component or product;

the specific company appending the test results to the electronic specification;

the specific company determining if the product is completed; and

either shipping the completed product to the customer or forwarding the electronic specification with appended test results to another one of the several companies.

2. The method of claim 1 wherein the forwarding step includes the step of providing a central server to centralize the forwarding step.

3. The method of claim 2 including the further step of providing a bill of materials for the components and the product at the time the electronic specification is developed.

4. The method of claim 3 including the further step of periodically comparing the bill of materials to the electronic specification to verify the accuracy of both.

5. The method of claim 4 including the further step of saving at least one updated version of the electronic specification.

6. The method of claim 5 including the further step of comparing the updated version of the electronic specification with an electronic specification having appended test results.

7. The method of claim 5 including the further step of revising the updated version to include late customer changes.

8. The method of claim 7 including the further step of comparing the revised updated version of the electronic specification with an electronic specification having appended test results;

wherein the comparing step includes the steps of determining and implementing late customer changes to the electronic specification in the product or components.

9. A method of integrating the manufacture of a product by a plurality of businesses, the method comprising:

generating a sales order in an electronic form;

converting the sales order to an electronic build document;

transferring the electronic build document to a first company for the construction of a first subassembly for the product;

testing the subassembly of the first company;

attaching the test results to the electronic build document;

forwarding the electronic build document to a second company for main assembly;

attaching a communications bus to the product;

testing the operability of the bus;

adding the bus operability test results to the electronic build document;

attaching the first subassembly to the bus;

testing the operability of the first subassembly and the bus;

attaching the subassembly and bus operability test results to the electronic build document; and

shipping the product.

10. A method of doing business comprising:

generating a sales order representative of a product;

developing build and test instructions from the sales order;

developing an installation sequence from the build and test instructions; and

building the product using the build and test instructions in the sequence laid out by the installation sequence.

11. The method of claim 10 wherein the developing and building steps are performed under the control of a control device.

12. The method of claim 10 wherein the product includes a communications bus, and input and output components to be operably linked to the bus.

13. The method of claim 12 wherein the developing an installation sequence step is accomplished by a tester device which also oversees the building step.

14. The method of claim 13 wherein the building step includes the further steps of:

calling for the next input or output component to be operably connected to the communication bus as identified by the installation sequence; and

verifying the operability of the component and the bus.

15. The method of claim 14 including the further steps of:

receiving a first signal from the component by means of the bus;

determining a unique identity for the signaling component; and

responding, by means of the bus, with a second signal to the component providing the component with an identity.

16. The method of claim 15 wherein the responding step further includes the step of providing the signaling component with operational parameters.

17. The method of claim 16 wherein the generating step includes the further step of creating a bill of materials and a specification.

18. The method of claim 17 wherein the developing the build and test instruction step includes the further step of using the specification to create a build and test file.

19. The method of claim 18 wherein the build and test file is in the xml format.

20. The method of claim 19 wherein the installation sequence developing step includes the further step of cross checking the installation sequence with the specification.

21. The method of claim 20 wherein the installation developing sequence includes a further step of cross checking the bill of materials with the installation sequence.

22. The method of claim 21 wherein the verifying step includes the further steps of testing the operation of the communications bus, testing the operation of the component, and cross checking the identity, parameters and operation of the component and the bus with the specification.

23. A method of manufacturing a distributed control system for a product having a plurality of components, each component including a functional portion and a controller portion, the method comprising the steps of:

attaching a communications bus to the product;

attaching the functional portion of a component to the product and attaching the controller portion of a component to the bus;

causing the controller portion to send a self-identifying signal on the bus;

receiving the self-identifying signal in a configuring controller;

transmitting from the configuring controller to the controller portion a signal including an identifier and operating parameters;

receiving the identifier and the operating parameters in the controller portion; and

configuring the controller portion in accordance with the identifier and the operating parameters.

24. The method of claim 23 including the further steps of testing the operation of the component and the bus and storing the results in an electronic build file.

25. The method of claim 24 wherein the causing step includes the further step of magnetically signaling the component.

26. The method of claim 24 wherein the testing step includes a technician making the operable connections and further include the further step of communicating between the technician and the test controller using a plurality of wireless communications medium.

27. The method of claim 26 wherein the communicating step includes the further step of the configuring controller providing a visual instruction to the technician indicating the next component to be attached and the technician subsequently providing a wireless signal to the test controller indicating that the component has been attached.

28. The method of claim 27 wherein the wireless signal is a radio frequency signal.

29. The method of claim 27 wherein the configuring controller confirms receipt of the wireless signals through the use of an audible tone.

30. The method of claim 29 wherein the audible tone causes the technician to apply a magnetic signal to the component.

31. The method of claim 30 wherein the receipt of a magnetic signal by the component causes the component to transmit a request for an identity on the bus.

32. A method of building a product comprising the steps of:

creating an electronic build document cataloging the features and requirements for the product;

forwarding the electronic build document to at least one component manufacturer, each component manufacturer building one or more components, testing the operability of said one or more components, and attaching the test results to the electronic build document to create a modified electronic build document;

forwarding the modified electronic build document to a final assembly location wherein the one or more components and other materials are assembled into the product;

testing the assembled product; and

attaching the test results for the assembled product to the modified electronic build file to create a final electronic build file.

33. The method of claim 32 including the further step of creating component records from the test results of the final electronic build file.

34. The method of claim 32 wherein the creating step includes the further step of creating a duplicate electronic build document.

35. The method of claim 34 including the further steps of updating the duplicate electronic build document with late customer changes and comparing the modified electronic build file with the updated duplicate electronic build document to verify and implement the late customer changes.

36. The method of claim 32 wherein the testing step includes the further steps of:

analyzing a signal on a power line to determine a quality thereof;

analyzing a signal on a communications line to determine a quality thereof;

generating a power analysis result signal as a function of the power line signal analysis;

generating a communications line analysis result signal as a function of the communications line signal analysis;

evaluating the results signals; and

providing a comprehensive analysis of the power line, the communications line, the power line signal, the communications line signal, a communications bus, and any components attached thereto.

37. The method of claim 32 wherein the testing step includes the further steps of:

attaching a tester controller to a bus;

providing a path from the tester controller to a technician;

instructing, on the path, the technician to attach a specific one of a plurality of components to the bus;

signaling, with a first signal from the technician to the tester controller, upon completion of the component attachment;

signaling, with a second signal from the tester controller to the technician, to confirm receipt of the first signal;

causing a subcontroller to signal a main controller with a third signal; and

configuring, upon receipt of the third signal, the subcontroller by transmitting configuration instructions from the main controller to the subcontroller over the bus.

38. A method of doing business comprising the steps of:

electronically creating a customer order which includes the requirements and components for a product desired by the customer;

developing a bill of materials from the electronic order detailing the parts and materials required to build the product;

developing an electronic specification from the customer order detailing the components, subassemblies and product required by the customer;

sequentially transmitting the specification to the manufacturer of each component, assembly and final assembly, each manufacturer building the requisite component, subassembly or assembly, each manufacturer testing the requisite component, subassembly or assembly, and each manufacturer attaching the test results to the electronic specification; and

periodically checking the electronic bill of materials versus the electronic specification to verify the compatibility and accuracy thereof.

39. The method of claim 38 wherein one of the components includes a communication system having a bus and including the further steps of:

guiding a technician in manufacturing the communication system;

attaching a tester controller to the bus;

providing a path from the tester controller to the technician;

instructing, on the path, the technician to attach a specific one of the plurality of components to the bus;

signaling, with a first signal from the technician to the tester controller, upon completion of the component attachment;

signaling, with a second signal from the tester controller to the technician, to confirm receipt of the first signal;

causing a subcontroller to signal a main controller with a third signal; and

configuring, upon receipt of the third signal, the subcontroller by transmitting configuration instructions from the main controller to a subcontroller over the bus.

40. The method of claim 39 wherein each component includes a control portion and a functional portion with an operational link therebetween and including the further steps of:

verifying the operability of the communications bus by means of a tester controller;

initiating, under the direction of the tester controller, a request that one of the plurality of components be attached to the bus;

receiving the signal from the newly connected component by means of the communications bus;

analyzing the communications bus and the newly connected component for operability; and

responding to signal from the newly connected component by means of the communications bus with instructions providing an identity and operating parameters to the newly connected component.

41. The method of claim 40 wherein the initiating step includes the further steps of:

causing the desired component to send the message on the communications bus;

waiting for the message from the newly connected component; and

recognizing the signal.

42. A method of manufacturing a control system for an industrial or a process unit comprising:

providing a plurality of components, each component including a control portion and a functional portion with an operational link therebetween;

installing a communications bus on the unit;

verifying the operability of the communications bus by means of a tester device;

initiating, under the direction of the tester device, a request that one of the plurality of components be attached to the bus;

receiving the signal from the newly connected component by means of the communications bus;

analyzing the communications bus and the newly connected component for operability; and

responding to signal from the newly connected component by means of the communications bus with instructions providing an identity and operating parameters to the newly connected component.

43. The method of claim 42 wherein the initiating step includes the further steps of causing the desired component to send the message on the communications bus, waiting for the message from the newly connected component; and recognizing the signal.

44. The method of claim 43 wherein the causing step includes the further step of initiating a visual signal to a technician.

45. The method of claim 43 wherein the causing step includes the further step of magnetically triggering the component.

46. The method of claim 45 wherein the causing step includes the further step of transmitting a visual or audible signal to the technician so as to cause the technician to initiate the magnetic trigger.

47. The method of claim 46 including the further step of operating the components in accordance with the identity and operating parameters.

48. The method of claim 42, the communications bus including a power line and a communications line, wherein the analyzing step includes the steps of:

analyzing a signal in the power line to determine a quality thereof;

analyzing a signal on the communications line to determine a quality thereof;

generating a power analysis result signal as a function of the power line signal analysis;

generating a communications line analysis result signal as a function of the communications line signal analysis;

receiving the power line and communications line result signals in a controller;

evaluating the received signals; and

providing a comprehensive analysis of the power line, the communications line, the power line signal, the communications line signal, communications bus, and any components attached thereto.

49. A method of guiding a technician in manufacturing a communication system having a bus, a main controller, a plurality of components, and a subcontroller associated with each component; the method comprising the steps of:

attaching a tester controller to the bus;

providing a path from the tester controller to the technician;

instructing, on the path, the technician to attach a specific one of the plurality of components to the bus;

signaling, with a first signal from the technician to the tester controller, upon completion of the component attachment;

signaling, with a second signal from the tester controller to the technician, to confirm receipt of the first signal;

causing the subcontroller to signal the main controller with a third signal; and

configuring, upon receipt of the third signal, the subcontroller by transmitting configuration instructions from the main controller to the subcontroller over the bus.

50. The method of claim 49 wherein the causing step includes the further step of using a magnet to initiate the third signal from the subcontroller of the particular component.

51. The method of claim 50 wherein the first signal is a wireless radio frequency signal and the second signal is an audible signal.

52. The method of claim 49 wherein the first signal is a wireless radio frequency signal and the second signal is an audible signal.

53. A bus analyzer system comprising:

a communications bus;

an integral analyzer device operably connected to the bus and configured to receive signals thereon, the analyzing device including a scope instrument and a voltage meter instrument configured to receive those signals, and a computer operably connected to the scope and voltage meter instruments wherein the scope and voltage meter instruments and the computer collectively analyze the bus and take corrective actions as needed.

54. The analyzer system of claim 53 wherein the scope and voltage meter instruments include the capability to analyze 24 VDC signals and ground signals for DC voltage magnitude and AC components.

55. The analyzer system of claim 54 wherein the scope and voltage meter instruments include the capabilities to analyze communications plus and minus lines for magnitude and to determine an RS485 differential signal to verify signals to be within design limits.

56. The analyzer system of claim 55 wherein the scope and voltage meter instruments include the capability to test for common mode characteristics such as magnitude with respect to ground and differential and common mode signal aspects for logic 1 and logic 0 signals.

57. A bus analyzer system comprising:

a communications bus;

an integral analyzer device operably connected to the bus and configured to receive signals thereon, the analyzing device including a scope instrument and a voltage meter instrument configured to receive those signals, and a computer operably connected to the scope and voltage meter instruments wherein the scope and voltage meter instruments and the computer collectively analyze the bus and take corrective actions as needed;

wherein the scope and voltage meter instruments include the capability to analyze 24 VDC signals and ground signals for DC voltage magnitude and AC components;

wherein the scope and voltage meter instruments include the capabilities to analyze communications plus and minus lines for magnitude and to determine an RS485 differential signal to verify signals to be within design limits; and

wherein the scope and voltage meter instruments include the capability to test for common mode characteristics such as magnitude with respect to ground and differential and common mode signal aspects for logic 1 and logic 0 signals.

58. A method of verifying the integrity of a communications bus having a power line and a communications line, the method comprising the steps of:

analyzing a signal on the power line to determine a quality thereof;

analyzing a signal on the communications line to determine a quality thereof;

generating a power analysis result signal as a function of the power line signal analysis;

generating a communications line analysis result signal as a function of the communications line signal analysis;

receiving the power line and communications line result signals in a controller;

evaluating the received signals; and

providing a comprehensive analysis of the power line, the communications line, the power line signal, the communications line signal, communications bus, and any components attached thereto.

59. A monitor for a communications bus having a power line and a communications line comprising:

a power line analyzer operably connected to a source of power and having circuitry and programs to analyze the transmissions on the power line and generate a first signal with the analysis results thereof;

a communications line analyzer operably connected to the communications line having circuitry and programs to analyze communication signals on the communications line and generate a second signal with the results thereto;

a controller operably connected to the power line analyzer and the data line analyzer for receiving the first and second signals and being operably capable of evaluating the content of the first and second signals and providing an analysis of the signals, the power line, the communications line and the communications bus as well as any components attached thereto.